

**Docket No. SA-537**

**Exhibit No. 2-J**

**NATIONAL TRANSPORTATION SAFETY BOARD**

**Washington, D.C.**

Operations Group Chairman Factual Report

Asiana SFO Special Airport Training Slides

(27 Pages)

# Attachment 9

To Operations Group Factual Report

DCA13MA120

Asiana SFO Special Airport Training Slides

SFO

시각 교재 (A/V SYSTEM) 현황

ASIANA AIRLINES 

## ◆ 목 차 ◆

### 1. '2013 SFO 시각교재 개정 일지

### 2. SFO 시각교재 현황

- 시각교재 전체 현황 (개정일자 2013.5.15)
- 개정 페이지 (개정일자 2013.05.28)
- 개정 페이지 (개정일자 2013.07.22)
- 개정 페이지 (개정일자 2013.08.02)
- 개정 페이지 (개정일자 2013.09.10)

## 1. '2013 SFO 시각교재 개정 일지

공항	일자	SECTION	수정/보완내용
SFO	13.05.15	INFO	오타 수정 (34691m->3469m)
		CASE STUDY	FLEET : B777 -> B747
	13.05.28	Approach A	제목 수정 (ILS or LOC Rwy 28L,28R -> ILS or LOC <b>Z</b> Rwy 28L,28R)
		Approach B	
	13.07.22	RWY	Displace Thresholds Added RWY 28L,28R
	13.08.02	INTRO	특수공항 지정 기준 게재
	13.09.10	Departure RWY Approach A~D	CHART 및 INFO, 제목 수정
	13.09.23	INTRO	구CI 삭제

## 2. SFO 시각교재 현황

가. 시각교재 전체 현황 (개정일자 2013.5.15)

A/V - Windows Internet Explorer


AIRPORT AV


ASIANA AIRLINES

### Info


KSFO/ SFO	Elev : 13FT
N 37 37' 1"	Alternate Airport :
W 122 22' 5"	KOAK, KLAX, KLAS

10L/28R	11870FT(3618m)	200FT(61m)
10R/28L	11381FT(3469m)	200FT(61m)
01L/19R	7500FT(2286m)	200FT(61m)
01R/19L	8648FT(2636m)	200FT(61m)






**CASE STUDY**  
- JAN 2010 / 02713

 **Location**

# San Francisco Int'l Airport

REVISION : 2013. 05. 15

Special Airport  airports List

**General**   **Arrival**   **Departure**   **Special**   **Safety**

**SFO** San Francisco Airport

A/V - Windows Internet Explorer

AIRPORT AV

ASIANA AIRLINES

## Area Information

**North America Area Information**

### 1. Route Structure

- NOPAC Route system is comprised of five ATS route which transit the North Pacific between Alaska and Japan.
- OTR have been established for aircraft transitioning to or from the NOPAC route.
- Route is comprised of OTR (Oceanic Transition Route) and NOPAC (North Pacific) Route for returning flight.
- Route is comprised of OTR and PACOTS (Pacific Organized Track System) Route.
- Minimum lateral separation is 50NM based on RNP-10 and 1000FT vertical separation based on RVSM.
- Refer to Enroute Chart P1/2 for enroute procedure.

### 2. Special procedure for in flight contingency

(1) General procedure

- If an aircraft is unable to continue the flight in accordance with ATC clearance a revised clearance shall be obtained prior to initiating action.
- The radiotelephony distress signal or urgency signal preferably spoken 3 times shall be used as appropriate.

(2) If prior clearance cannot be obtained

- Leave the assigned route by initially turning at least 45 degrees to the right or to the left.
- If unable to maintain the assigned altitude, minimize the rate of descent.
- Take account of other aircraft being laterally offset from its track.
- Acquire lateral separation by 15NM.
- Once established on the offset route, maintain level which differs from those normally used by 500FT.

**General**   **Arrival**   **Departure**   **Special**   **Safety**   **SFO** San Francisco Airport

A/V - Windows Internet Explorer

AIRPORT AV

ASIANA AIRLINES

## RRWY

**General**   **Arrival**   **Departure**   **Special**   **Safety**   **SFO** San Francisco Airport









A/V - Windows Internet Explorer

AIRPORT AV

ASIANA AIRLINES 7

GOLDEN GATE SIX ARRIVAL  
(PYE.GOLDN6)

→ Arrival

open

**1. ROUTING**  
From over PYE via SFO R-303 to SFO, EXPECTing RADAR vectors to final approach course.

- \* Alt Set : INCHES
- \* Trans level : FL 180 / Trans alt : 18000'
- \* For use by turbojet aircraft only.
- \* RADAR required.

**2. Alternate Airport**

- ALT AIRPORT NAME : OAKLAND AIRPORT(KOAK)
- DISTANCE : 65 NM
- AIR WAY : OAK V301 SUNOL

i  
close X

General Arrival Departure Special Safety

**SFO** San Francisco Airport

A/V - Windows Internet Explorer

AIRPORT AV

ASIANA AIRLINES 7

BIG SUR TWO ARRIVAL  
(BSR. BSR2)

← Arrival

on  
i  
close

on  
i  
close

General Arrival Departure Special Safety

**SFO** San Francisco Airport



A/V - Windows Internet Explorer

AIRPORT AV

ASIANA AIRLINES

BIG SUR TWO ARRIVAL  
(BSR. BSR2)

← Arrival

open

\*\* TURBOJET AIRCRAFT ONLY  
 \*\* RADAR & DME REQUIRED  
 \*\* RWYS 28L/R  
  
 \*\* Direct distance from Menlo Int to :  
 San Francisco Intl Apt 14 NM  
  
 \*\* Alternate Airport  
 - ALT AIRPORT NAME : LAS VEGAS AIRPORT(KLAS)  
 - DISTANCE : 244 NM  
 - AIR WAY : DAG . . BLD  
 - APPROACH CHART : ILS RWY 1L/R, ILS RWY 25L/R

close

General Arrival Departure Special Safety

**SFO** San Francisco Airport

A/V - Windows Internet Explorer

AIRPORT AV

ASIANA AIRLINES

500ft

ILS or LOC RWY 28R → Approach

on

i

close

1. When visual approaches to Runway 28 L/R are in progress, arriving aircraft may be vectored into a position for a straight-in visual approach to Runways 28 L/R via the SFO VOR R-095.  
 2. SFO VOR and DME must be operating.  
 3. MISSED APPROACH  
 Climb to 600', then climbing LEFT turn to 3000' via 281° heading and outbound on SFO VOR R-279 to VIKYU INT/D12.0 SFO and hold. Obstructions in the missed approach area require a minimum rate of climb of 400 feet per minute/100kt. 600fpm/150kt, 800fpm/200kt to 900' ; no wind conditions.

close

General Arrival Departure Special Safety

**SFO** San Francisco Airport

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AIRPORT AV

ASIANA AIRLINES

ILS or LOC RWY 28L ← → **Approach**

1. DME required.
2. Use ISFO DME when on LOC course.
3. VGSI and ILS glidepath not coincident.
4. MISSED APCH  
Climb to 2100', then climbing RIGHT turn to 3000' on 285° heading and outbound on SFO VOR R-280 to OLYMM INT/ D15.0 SFO and hold, or as directed by ATC.

close

General Arrival Departure Special Safety

**SFO** San Francisco Airport

A/V - Windows Internet Explorer

AIRPORT AV

ASIANA AIRLINES

San Mateo Bridge전경

QUIET BRIDGE VISUAL RWYS 28L/R ← → **Approach**

1. When visual approaches to Runway 28 L/R are in progress, arriving aircraft may be vectored into a position for a straight-in visual approach to Runways 28 L/R via the SFO VOR R-095.
2. SFO VOR and DME must be operating.
3. Aircraft should remain on the SFO VOR R-095 until passing the San Mateo Bridge.
4. No Missed Approach procedure

close

General Arrival Departure Special Safety

**SFO** San Francisco Airport



A/V - Windows Internet Explorer

AIRPORT AV

ASIANA AIRLINES

## TIPP TOE VISUAL RWY 28L

# Approach

on  
i  
close

1. When visual approaches to Runway 28 L/R are in progress, arriving aircraft may be vectored into a position for a straight-in visual approach to Runways 28 L/R via the SFO VOR R-095.

2. SFO VOR and DME must be operating.

3. Aircraft should remain on the SFO VOR R-095 until passing the San Mateo Bridge.

4. No Missed Approach procedure

i  
close

General Arrival Departure Special Safety

**SFO** San Francisco Airport

A/V - Windows Internet Explorer

AIRPORT AV

ASIANA AIRLINES

## Taxi-in

Taxi In 2  
close

on  
i  
close

General Arrival Departure Special Safety

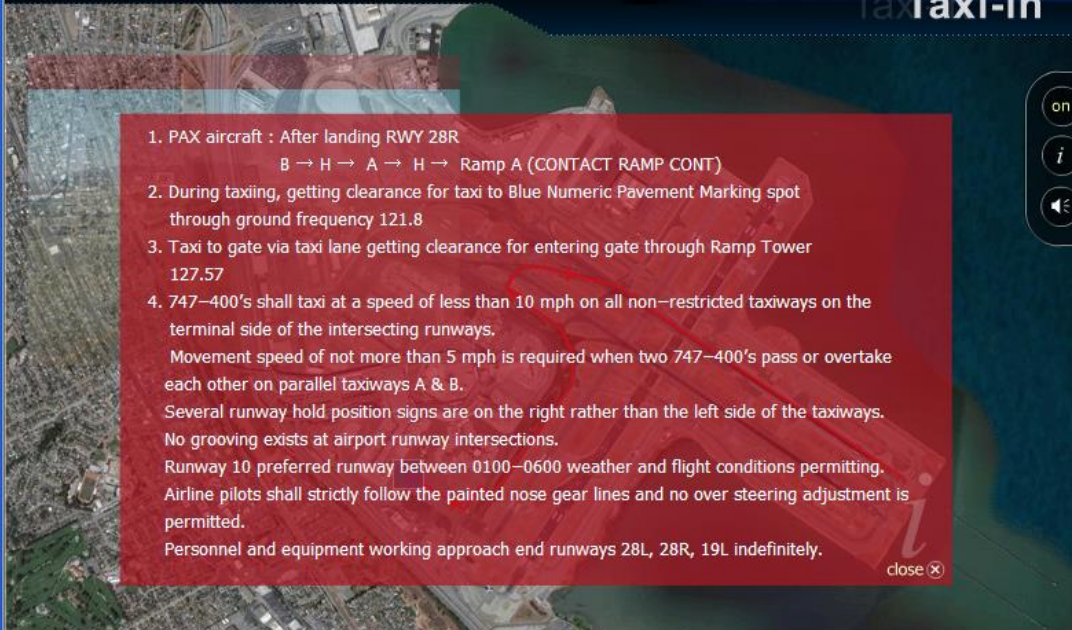
**SFO** San Francisco Airport

A/V - Windows Internet Explorer

AIRPORT AV

ASIANA AIRLINES

# Taxi-in



1. PAX aircraft : After landing RWY 28R  
B → H → A → H → Ramp A (CONTACT RAMP CONT)

2. During taxiing, getting clearance for taxi to Blue Numeric Pavement Marking spot through ground frequency 121.8

3. Taxi to gate via taxi lane getting clearance for entering gate through Ramp Tower 127.57

4. 747-400's shall taxi at a speed of less than 10 mph on all non-restricted taxiways on the terminal side of the intersecting runways.  
Movement speed of not more than 5 mph is required when two 747-400's pass or overtake each other on parallel taxiways A & B.  
Several runway hold position signs are on the right rather than the left side of the taxiways.  
No grooving exists at airport runway intersections.  
Runway 10 preferred runway between 0100-0600 weather and flight conditions permitting.  
Airline pilots shall strictly follow the painted nose gear lines and no over steering adjustment is permitted.  
Personnel and equipment working approach end runways 28L, 28R, 19L indefinitely.

close x

General Arrival Departure Special Safety

**SFO** San Francisco Airport


A/V - Windows Internet Explorer

AIRPORT AV

ASIANA AIRLINES

PAX RAMP →

# Ramp-in



Ramp in 2 (Diamond Line)

close x

CAUTION : 747-400 aircraft will taxi at speeds of less than 10kts on all non-restricted taxiways on the terminal side of the intersecting runways. 747-400 series aircraft will taxi at speeds of less than 5kts when passing or overtaking other 747-400 aircraft on taxiways A and B. Aircrews will strictly follow the painted taxiway lines. No oversteering permitted.

close x

General Arrival Departure Special Safety

**SFO** San Francisco Airport



A/V - Windows Internet Explorer

AIRPORT AV

ASIANA AIRLINES

# ATC & ENGINE START

## ATC PROCEDURE

1. Departure & Arrival Control  
SFO clearance / 118.2 → Ramp Tower (PAX) / 127.57 → SFO Ground / 121.8 +> SFO TOWER / 120.5 → NORCAL Departure / 135.1 → OAK CENTER  
\* ATS 135.45
2. SFO clearance : Request clearance 10~30 minutes before departure.
3. RAMP TOWER (PAX ONLY) : Push back request.  
SFO GROUND : Taxi clearance instruction.
4. SFO tower : take-off instruction & departure frequency instruction.
5. Arrival is operated by reverse of departure frequency when coming out of rwy after landing, change tower frequency / 120.5 to ground frequency / 121.8 after instruction
6. Contact ground control at BLUE NUMERIC PAVEMENT REPORTING POINT.

**General**   **Arrival**   **Departure**   **Special**   **Safety**


**SFO** San Francisco Airport

A/V - Windows Internet Explorer

AIRPORT AV

ASIANA AIRLINES

# Taxi-out



**General**   **Arrival**   **Departure**   **Special**   **Safety**

**SFO** San Francisco Airport

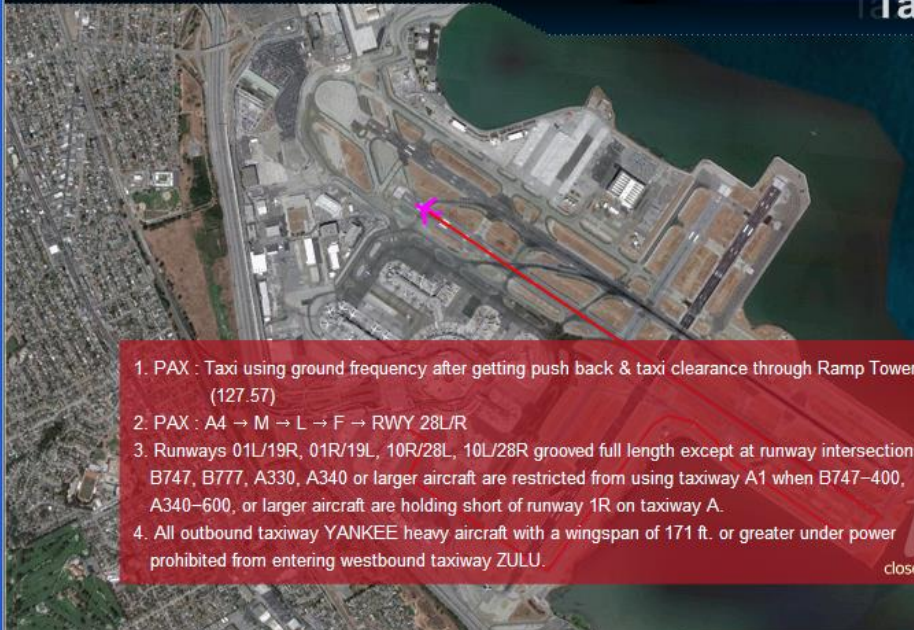


A/V - Windows Internet Explorer

AIRPORT AV

ASIANA AIRLINES

## Taxi-out



on  
i  
close

1. PAX : Taxi using ground frequency after getting push back & taxi clearance through Ramp Tower (127.57)
2. PAX : A4 → M → L → F → RWY 28L/R
3. Runways 01L/19R, 01R/19L, 10R/28L, 10L/28R grooved full length except at runway intersections. B747, B777, A330, A340 or larger aircraft are restricted from using taxiway A1 when B747-400, A340-600, or larger aircraft are holding short of runway 1R on taxiway A.
4. All outbound taxiway YANKEE heavy aircraft with a wingspan of 171 ft. or greater under power prohibited from entering westbound taxiway ZULU.

close

General Arrival Departure Special Safety

**SFO** San Francisco Airport

A/V - Windows Internet Explorer

AIRPORT AV

ASIANA AIRLINES

## Departure

MOLEN FOUR DEPARTURE (MOLEN4. MOLEN)  
(RWYS 10L/R, 19L/R, 28L/R)



on  
i  
close

MOLEN  
MENDOCINO (MOLEN4. ENI) 6000-348  
MENDOCINO 112.3 ENI  
POINT REYES 113.7 PYE  
SAUSALITO 116.2 SAU  
STINS RWYS 10L/R AND 19L/R At 5000'  
WESLA At or above 1800'  
SAN FRANCISCO 115.8 SFO  
SIPLY At or above 2500'

050° hdg  
230° hdg  
090°

General Arrival Departure Special Safety

**SFO** San Francisco Airport

A/V - Windows Internet Explorer

AIRPORT AV

ASIANA AIRLINES

## MOLEN FOUR DEPARTURE (MOLEN4. MOLEN) (RWYS 10L/R, 19L/R, 28L/R) → Departure

open

10L/R : Climbing LEFT turn to intercept SFO R-090 to cross SIPLY at or above 2500', then climbing RIGHT turn to 5000' on heading 230' to intercept and proceed on PYE-144 ' to cross STINS at 5000, then on SFO-287 to MOLEN.

19L/R : Climbing LEFT turn heading 050' to intercept SFO R-090 to cross SIPLY at or above 2500' , then climbing RIGHT turn to 5000' heading 230 ' to intercept and proceed on PYE-144 to cross STINS at 5000', then on SFO-287 to MOLEN.

28L/R : Climb on SFO R-281 to cross WESLA at or above 1800', then turn RIGHT to intercept SFO R-287 to MOLEN.

close

General Arrival **Departure** Special Safety

**SFO** San Francisco Airport

A/V - Windows Internet Explorer

AIRPORT AV

ASIANA AIRLINES

## GAP FIVE DEPARTURE (GAPP5. SFO) (VETOR) ← Departure

on

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close

NORMM  
EXPECT vectors after NORMM

San Francisco Intl  
13

281°  
D12.9

090°  
D14.5

BARTN

SAN FRANCISCO  
115.8 SFO

WOODSIDE  
113.9 OSI

208°  
R028

EXPECT vector after OSI

General Arrival **Departure** Special Safety

**SFO** San Francisco Airport

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AIRPORT AV

ASIANA AIRLINES

GAP FIVE DEPARTURE (GAPP5. SFO)  
(VETOR) ← **Departure**

1L/R : Climb on SFO R-350 (or as assigned) for vector to assigned route/fix.

10L/R, 19L/R : Turn LEFT and climb on the SFO R-090 and OSI R-028 to OSI. EXPECT vector to assigned route/fix after OSI.

28L/R : Climb on the SFO R-281 to NORMM. EXPECT vector to assigned route/fix after NORMM.

open

close

General Arrival **Departure** Special Safety **SFO** San Francisco Airport

A/V - Windows Internet Explorer

AIRPORT AV

ASIANA AIRLINES

SFO → ICN ⏪ **en-route**

General Arrival Departure Special Safety **SFO** San Francisco Airport





A/V - Windows Internet Explorer

AIRPORT AV

ASIANA AIRLINES

## Communicate

**COMMUNICATION FAILURE**

1.If not contact with departure control after reaching 3000FT, continue climb to assigned altitude and proceed direct to assigned route/fix.

**SFO FUEL DUMPING AREA**

1.If fuel dumping is necessary, request radar vectoring to the dumping area when ready, return for L/D at SFO INTL.

General Arrival Departure Special Safety

**SFO** San Francisco Airport

A/V - Windows Internet Explorer

AIRPORT AV

ASIANA AIRLINES

## One-Engine

RWY 01L/R  
: COMMENCE A 15 DEGREE BANKED CLIMBING -LEFT- TURN AT D4.0 SFO VOR/DME TO A MAG COURSE OF 340 DEGREES.

RWY 19L/R  
: COMMENCE A 15 DEGREE BANKED CLIMBING -LEFT- TURN AT D1.0 SFO VOR/DME, TO A MAG COURSE OF 070 DEGREES. INTERCEPT AND TRACK OUTBOUND ON SFO VOR R-100.

RWY 28L/R  
: COMMENCE A 15 DEGREE BANKED CLIMBING -RIGHT- TURN AT D2.5 SFO VOR/DME, TO A MAG COURSE OF 310 DEGREES. INTERCEPT AND TRACK OUTBOUND ON THE SAU VOR R-250.

General Arrival Departure Special Safety

**SFO** San Francisco Airport



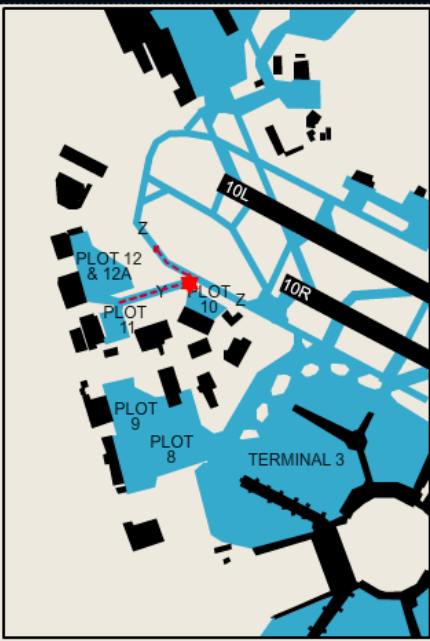
A/V - Windows Internet Explorer

AIRPORT AV

ASIANA AIRLINES

## Case Study 1

### JET BLAST DAMAGE THE SHUTTER DOOR OF CHINA AIRLINES BUILDING



- Abstract
  - DATE : 2010. 01
  - AIRPORT : KSFO
  - FLEET : B747
  - WEATHER : VMC, Wind Calm, CAVOK, QNH 3012, Precipitation Nil
- Details
  - OZ283 started taxi via taxi way Y→Z→S2 to RWY 10L.
  - To make sharp turn (approx. 110 °) from TWY Y to westbound TWY Z, OZ 283 increased thrust to compensate reduced Ground Speed during turn (47.9% max NO.4 engine).
  - Air blast damaged the shutter door of China Airlines building.
- Safety Recommendations
  - Comply with the safety note on the chart 10-9.
  - Request right turn to eastbound TWY Z instead of left turn westbound TWY Z considering gross weight at the moment
  - If taxiway is wide enough, make a gentle turn instead of a sharp one.

General Arrival Departure Special Safety

**SFO** San Francisco Airport


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AIRPORT AV

ASIANA AIRLINES

## Obstacles

OBSTACLE



on

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Obstacle

close

- SFO airport is located in front of peninsula which is in contact with westerly Pacific, easterly SFO bay, northerly Golden gate bridge.
- 1539 ft SAN BRUNO Mt. Is located in 5NM northwest from the airport, 2086 ft tall of Mt. 6NM southwest from the airport
- Takeoff obstacle

RWY 28L: Building, 1013' from DER, 764' left of centerline, 43' AGL/44' MSL. Electrical system, 1792' from DER, 768' left of centerline, 54' AGL 55' MSL. Light on hangar, 2344' from DER, 1061' left of centerline, 76' AGL /77' MSL. Light on transmission tower, 3673' from DER, 1302' Left of centerline, 130' AGL /139' MSL.

RWY 28R: Light on antennae, 557' from DER, 299' right of centerline, 20' AGL /21' MSL. Antennae on building, 1187' from DER, 268' right of centerline, 40' AGL /41' MSL. Camera on building, 1532' from DER, 817' right of Centerline, 64' AGL /65' MSL Electrical system 2773' from DER, 416' left Of centerline, 74' AGL /75' MSL Lights on transmission towers beginning 3235' from DER, 122' left of centerline, up to 100' AGL /101' MSL.

close

General Arrival Departure Special Safety

**SFO** San Francisco Airport

A/V - Windows Internet Explorer

AIRPORT AV

ASIANA AIRLINES

# NoNoise

**\*\* San Francisco International Airport Fly Quiet Program \*\***

1. Flight Crews : By operating your aircraft as quietly as possible, you can directly influence your airline's Fly Quiet Program score.
2. Preferential Runway Use : Between 0100 and 0600 LT the preferred departure runways for noise abatement are Runways 10L/R. Pilots of heavy aircraft can significantly improve Fly Quiet Scores by departing Runways 10L/R.
3. Shoreline Departure Turn Quality : Radius of turn is a grading element of the Fly Quiet Program (see diagram below). Runway 28 departures making excessively wide right turns overfly residential areas. By completing the initial right turn prior to crossing Highway 101, aircraft remain over industrial and business parks. This applies to all IDPs requiring right turns after departing Runway 28L/R.
4. Gap Departure Climb Quality : This departure directs aircraft over heavily populated areas. Since "higher is quieter", aircraft altitudes are recorded along the departure route. Scores are assigned at specific points or gates set approximately one mile apart, with the higher aircraft receiving higher scores. Runway 28L/R straight-out departures should climb as rapidly as possible.

**\*\* Noise Abatement and Operational Procedures \*\***

1. Arrivals : Regardless of the time of day, Runway 28R is the preferred arrival runway. Between 1:00 am and 6:00 am (0100-0600 LT) use preferred arrival routes.
2. Departures : Between the hours of 1:00 am and 06:00 am (0100-0600 LT) aircraft are expected to use noise abatement preferred runway whenever possible. Departure runway preference is as follows :
  - A - Runways 10L/R are the preferred runways for all operations.
  - B - Runways 28L/R departure with an immediate right turn.
  - C - Runways 01L/R departure.
  - D - Runways 28L/R straight out departure - Discouraged at all hours.

General   Arrival   Departure   Special   Safety

**SFO** San Francisco Airport

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AIRPORT AV

ASIANA AIRLINES

# Weak Point

**WEAK POINT : Q   SOLUTION : A**

Q:Narrow between TWY A & B  
A:Taxi after identifying other traffic and vehicles

Q:Narrow parking ramp area and close parking to terminal building  
A:Ramp approach after identifying near obstacles

Q:Narrow cargo plot 41 ramp  
A:Taxi after identifying left and right parking traffic

Q:Ground facility damage by engine power  
A:Do not use high power on taxi start after push back

Q:Violation for noise abatement procedure at night take-off(after 01:00)  
A:Use preferential T/O rwy if safe flight & weather is guaranteed

Q:Night operation aircraft use opposite rwy  
A:Identify ATC clearance precisely

Q:Expect holding instruction in case of bad weather condition  
A:Including holding procedure in study & briefing

General   Arrival   Departure   Special   Safety

**SFO** San Francisco Airport

나. 개정 페이지 (개정일자 2013.05.28)



다. 개정 페이지 (개정일자 2013.07.22)





라. 개정 페이지 (개정일자 2013.08.02/09.10/09.23)

A/V - Windows Internet Explorer

AIRPORT AV

### Info

KSFO/ SFO Elev : 13FT  
 N 37 37' 1" Alternate Airport :  
 W 122 22' 5" KOAK, KLAX, KLAS

10L/28R 11870FT(3618m) 200FT(61m)  
 10R/28L 11381FT(3469m) 200FT(61m)  
 01L/19R 7500FT(2286m) 200FT(61m)  
 01R/19L 8648FT(2636m) 200FT(61m)

SAN FRANCISCO INTERNATIONAL



**CASE STUDY**  
- JAN 2010 / OZ283

**Location**

**San Francisco Int'l Airport**

REVISION : 2013.09.23

airports List

Special Airport Designation Standard  
 Specific Procedures (for Departure, Arrival),  
 Mountainous terrain near the airport

General Arrival Departure Special Safety

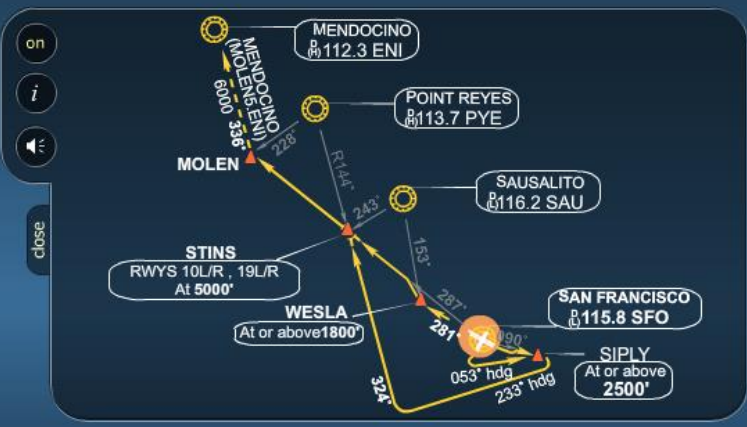
**SFO** San Francisco Airport

마. 개정 페이지 (개정일자 2013.09.10)

A/V - Windows Internet Explorer

AIRPORT AV

MOLEN FIVE DEPARTURE (MOLEN5. MOLEN)  
 (RWYS 10L/R, 19L/R, 28L/R) → **Departure**



on  
i  
close

General Arrival Departure Special Safety

**SFO** San Francisco Airport







A/V - Windows Internet Explorer

AIRPORT AV

TIPP TOE VISUAL  
RWY 28L/R

Approach

1. When visual approaches to Runway 28 L/R are in progress, arriving aircraft may be vectored into a position for a straight-in visual approach to Runways 28 L/R via the ISFO localizer.

Aircraft should cross the OAK VOR R-151/ D16.1 (Menlo Int) at or above 5000' and the San Mateo Bridge at or above 1800'.

In the event of a go-around on Runway 28L, turn left heading 265°, or on Runway 28R, turn right heading 310°, climb and maintain 3000', or as directed by Air Traffic Control.

2. SFO VOR and DME must be operating.

3. Aircraft should remain on the SFO VOR R-095 until passing the San Mateo Bridge.

4. No Missed Approach procedure

General
Arrival
Departure
Special
Safety

**SFO** San Francisco Airport